The Albany Academy Traded Pathway Curriculum Policy – Science

Origins of the curriculum

The KS4 Springboard pathway science curriculum has been created based on the national curriculum. It considers the wide range of exam boards the pupils may come to us having been previously taught and looks at this in conjunction with the temporary nature of a placement on the springboard pathway. The curriculum develops understanding of both substantive knowledge and disciplinary knowledge carried forward from the KS3 national curriculum and guides them towards content to support exam success, college options and future career possibilities.

The science curriculum is clearly divided into biology, chemistry and physics units that have been consciously selected to develop core knowledge; build a solid foundation and support wider access to science within mainstream settings. The springboard pathway is optimised for pupils on a short-term placement with the Raedwald trust who will be returning to mainstream education.

Due to the possible short length of pupil placement, it is important that we carefully plan the order of the National Curriculum we will deliver. As such, the curriculum has been written sequentially to support development of core science knowledge within all disciplines of science, with a concentric element to revisit scientific skills within the units of study. Learners can spend time studying and understanding the core aspects of the subject area through both theoretical and practical investigation where appropriate. Working scientifically is embedded within each unit which ensures pupils understand the scientific method. Mathematical skills are taught and used through units as appropriate.

By studying this subject, pupils will be able to make observations about the world around them and explain how they have come about. Pupils will embed core knowledge and build on their skills of assessment, evaluation, and conclusion. They will enhance their decision-making ability: they will be better able to predict the effects of both their actions and those of wider society.

The curriculum has been specifically designed for our Alternative Provision (AP) setting. It is purposefully constructed from the national curriculum, giving consideration to the possible limited time of pupil pathway. It focuses on the key content which will support them when returning to their mainstream settings. We also focus on practical skills whenever possible as these are areas which we know that our pupils often have been able to engage in only a limited capacity. We recognise the importance of prior knowledge on building understanding and skills, we also recognise that due to previous attendance and engagement at mainstream settings, prior knowledge will be a key barrier for pupils coming to us. The curriculum has enough flexibility in it to adjust for challenges with prior knowledge being missed.

Content and sequencing

The topics we cover include the three disciplines of Biology, Chemistry, and Physics across the breadth of the KS4 Science Curriculum;

- Living cells
- Atomic structure
- Forces and energy
- The Human Body
- The Periodic Table
- Structure and Bonding
- Waves and Electromagnetism
- Health and Communicable diseases
- Acids and Alkalis
- Rates of reaction
- Energy Resources

The Albany Academy Traded Pathway Curriculum Policy – Science

- Circuits and electricity
- Genetics
- Variation and Evolution

Our objective in science is to support pupils' understanding of their environment and existence. We aim to support them in understanding how the world around them works and to give them perspective of their place within it and the impact they, and wider society can have, and their contribution to that, alongside awareness of their physical presence. We aim to give pupils social, technological, mathematical, verbal reasoning and literacy skills. We have organised our curriculum to begin with the most fundamental topics of Biology Chemistry and Physics and build in a sequential manner with concentric elements, ensuring regular recapping and revisiting to aid knowledge retention. This represents a balance of all sciences and reflects the reality of science learning they have received and will return to at their mainstream settings. It is a logical continuation of the scientific knowledge and skills gained at KS3. Pupils will enjoy the advantage of an appropriate baseline assessment, to gauge their attainment level and awareness of KS3 knowledge. A strong focus on prior learning in each lesson will ensure they have the key knowledge that they may have previously missed so that pupils can make required progress.
Due to the temporary nature of our placements, it is not possible to teach the full science GCSE syllabus. We have prioritised themes which link into the fundamental knowledge which all science topics build on. This will support pupils upon returning to mainstream as the topics are complementary. Although our curriculum choices are based on the national curriculum, we have closely followed some of the structures of the AQA double award. With AQA being the most common course, both nationwide and regionally, this will best support them when returning to mainstream. We have selected double science rather than a single science because it would limit post 16 options. If a pupil is following a different exam specification, lessons will be adapted accordingly. Exams will be arranged and hosted by mainstream settings.

The content will be delivered over a series of two lessons a week, for up to 2 years. We are aware that most students will not cover the full curriculum we offer, hence the regular revisiting and gap-filling lessons interspersed throughout. We have focused the start of the science curriculum on topics which act as the building blocks to all other topics.

Overview of units of study across the focused pathway placement

Subject Content - Year 1	**Subject Content – Year 2**
Biology	**Physics 2**
Cells	**Forces and energy recap lesson**
Typical cells	
Organelles	**Waves**
Specialised cells	Types of wave
Microscopes and microscopy	Measuring and calculating waves
Respiration	**The Electromagnetic spectrum**
Aerobic respiration	The Electromagnetic spectrum (EMS)
Anaerobic respiration	Uses of low frequency EMS waves
Comparing respirations	Use and risks of high frequency EMS waves
Fermentation	Magnetic fields
Photosynthesis	Fields and current
	The motor effect
Cellular Transport	*Physics 2 revision and assessment*
Diffusion	*Physics 2 assessment review*

The Albany Academy Traded Pathway Curriculum Policy – Science

Osmosis Active transport Revision Techniques Interpreting data and graphs *Biology revision and assessment* *Biology assessment review* **Chemistry** ***States of matter*** Changing states Mixtures and separating mixtures Density Gas pressure ***Atoms and molecules*** Atoms, molecules and compounds Structure of atoms Electronic structure Calculating RAM RAM and RFM *Chemistry revision and assessment* *Chemistry assessment Review* **Physics** ***Forces and energy*** Identifying forces Balanced forces Force diagrams Energy stores and transfers Conservation and dissipation EPE GPE KE and GPE Stopping distances *Physics revision and assessment* *Physics assessment review* **Biology 2** **Cells recap lesson** **Human Biology** Digestive Organs Enzymes Lungs and breathing Exchange Surfaces The Heart Blood and Blood Vessels The Nervous System Reactions and reflexes	**Biology 3** **Cells and human biology recap** **Health** Non communicable disease Smoking and alcohol **Communicable disease** Pathogen Cells Bacterial and Protist diseases Viral and Fungal diseases The immune system Vaccination *Biology 3 revision and assessment* *Biology 3 assessment review* **Chemistry 3** **States of matter and bonding recap lesson** **Acids and alkalis** pH and neutralisation Exothermic and endothermic reactions **Rates of reaction** Measuring rates of reaction Surface area Temperature, concentration and pressure Catalysts Carbon emissions **Atmospheric science** Global warming and climate change Burning fossil fuels *Chemistry 3 revision and assessment* *Chemistry 3 assessment Review* **Physics 3** **Energy recap lesson** **Energy resources** Energy resources Evaluating energy resources **Circuits electricity** Static electrical fields

The Albany Academy Traded Pathway Curriculum Policy – Science

Endocrine Organs Blood Glucose The Menstrual Cycle *Biology 2 Revision and assessment* *Biology 2 assessment review* **<u>Chemistry 2</u>** **Atomic structure and states of matter recap lesson** **Periodic Table** Structure of the periodic table Alkali metals Halogens Atoms and Ions **Structure and Bonding** Ionic bonding Giant ionic structures Covalent bonding Simple covalent bonding *Chemistry 2 revision and assessment* *Chemistry 2 assessment Review*	Current and charge P.D. and resistance Resistance and wire length Component characteristics Series circuits Parallel circuits *Physics 3 revision and assessment* *Physics 3 assessment review* **<u>Biology 4</u>** **Cells and Health recap lesson** **Genetics** Mitosis Meiosis Types of reproduction DNA and Genes Genetic diagrams Inherited disorders Variation **Variation and Evolution** Natural selection Antibiotic resistance Fossils and extinction Selective breeding Genetic engineering *Biology 4 Revision and assessment* *Biology 4 assessment review*

Scientific Skills

There will be scientific skills interwoven throughout. These skills will be revisited throughout each unit of study to help pupils embed skills that can be transferred back into their mainstream setting. The skills we will assess are:

· **Scientific Attitudes:**

Understand that scientific methods and theories develop as earlier explanations are modified to take account of new evidence and ideas, together with the importance of publishing results and peer review

· **Experimental Skills and Investigations:**

Ask questions and develop a line of enquiry based on observations of the real world, alongside prior knowledge, and experience

· **Analysis and Evaluation:**

Interpret observations and data, including identifying patterns and using observations, measurements, and data to draw conclusions

Present reasoned explanations, including explaining data in relation to predictions and hypotheses

We will use our baseline assessment to form a basis for pedagogical adaptation. This would include Irlen's, dyslexia, dyspraxia, and dyscalculia. We will also look at subject specific knowledge and individual pupil styles of learning I.e., auditory/visual/kinaesthetic strengths and weaknesses. We will use Individual learning plans (ILPs) and SEND Information as guidance to adjust our classroom practice as necessary to best support each pupil e.g., increased scribing, reading overlays, sentence starters and cloze techniques.

Assessment and outcomes

With our classes being small, teachers have the capacity to clearly monitor the progress each pupil makes in each lesson. This will allow staff to adjust the following lesson with regards to any short fall or misconceptions in pupil learning, so that they continue to progress at the expected level to successfully access the curriculum. We will also use a RAG rating on the whole school formative assessment tracker to monitor this long term, starting from their baseline level on arrival, for which an assessment is completed during our induction process. We can then feedback to their mainstream setting and it will inform us of weaknesses which need to be addressed in the future. Alongside this we will have end of module assessments for the content of each discipline within the placement. The assessment will be a series of exam questions for the content and skills covered, this will be completed in class as part of a timetabled lesson, in an open book and staff supported style. The assessment will cover 30 minutes of mixed style exam questions with a further lesson to review the outcome and identify areas to revisit. The purpose of it being open book is to avoid the increased pressure and anxiety which we historically know can be a trigger for disruptive behaviour and reduced attendance, whilst still giving pupils exposure to exam style questioning and giving pupils the opportunity to develop the skills required for exam success. This information will, alongside informing our planning, help us to demonstrate progress. It will also help the pupils identify areas of strength and weakness, to both support revision and make informed post 16 and career decisions.

The intended outcome of this will be for all pupils to return to school in a position to achieve a nationally recognised qualification in science which will help to open wider opportunities for post 16 and career choice.

Science and the wider curriculum

Modern Culture imbibes Science, so it is vitally important that Science is recognised in this context. In Science Teaching and Learning, we endeavour to explore and celebrate research and developments that take place in diverse cultures. We aim to expand Cultural Diversity and awareness, particularly with reference to the contemporary contribution of Culturally Diverse Scientists. Science has a major impact on the quality of our lives. Within Science Teaching and Learning, pupils consider the moral impact of Science and Technology upon our everyday lives e.g., Road safety and the value of life. Moral decisions are an important aspect of science. Within Science Teaching and Learning, pupils are encouraged to be both open minded and critical: we aspire to pupils developing and engaging their Moral Compass, helping them to understand their world. Scientists are collaborators. The sharing of ideas, data, and results is a key principle of the Scientific Method. We encourage pupils to work together on Scientific Investigations and to share results, to improve methodology, precision and reliability.

Within science we aim to discuss both contemporary and historic contributions to scientific discovery with examples from across the globe, expanding our knowledge beyond Eurocentric concepts and figures. When necessary, we will also identify, with a critical eye, scientific concepts which are outdated or controversial. We will aim to consider pupils' inherent environment with a desire to promote and expand more diverse experiences.

Literacy within Science

The Albany Academy Traded Pathway Curriculum Policy – Science

Literacy and communication cover a variety of skills, including taking and making notes, summarising information, presenting ideas/data, persuasive writing, and arguments. It also covers the 'spoken language' component of the National Curriculum. Teachers will incorporate metacognition and dialogue in the classroom, use activities to engage pupils with reading scientific text (helping them to comprehend it) and support pupils to develop their scientific writing skills. Technical vocabulary forms a key part of scientific learning, and it will form a part of every lesson. Key vocabulary will be explicitly defined for pupils to identify, absorb, and use as part of the wider lesson.